CLAIMS:

1. A method for decomposition of a multiple channel signal reflecting characteristics of a blood perfused fleshy medium for use in determination of at least one desired blood parameter, the method comprising:

(i) illuminating a portion of the medium by amplitude-modulated light of more than two different optic channels having wavelength in a range where the scattering properties of blood are sensitive to light radiation;

(ii) sensing a light response of the medium and generating said multiple channel signal; and

(iii) analyzing said multiple channel signal, where the analyzing includes:

(i) filtering said multiple channel signal and separating at least a part of multiple channels from each other; and

(ii) providing time evolutions of the light responses of the medium for the part of said multiple channels,

the method, wherein

said amplitude-modulated light is activated in a composite mode regime employing a combination of parallel and serial modes; and

the filtering of said multiple channel signal and the separating of said multiple channels from each other both includes applying an adaptive resonator bank to said multiple channel signal.

2. The method of claim 1 further comprising deriving at least one blood characteristic parameter as a relation between the different time evolutions of the light responses of the medium.

3. The method of claim 1 wherein said composite mode regime is a short serial mode regime.

4. The method of claim 3 wherein said short serial mode regime represents at least one on-off ignition cycle.

5. The method of claim 1 wherein said composite mode regime is a short serial-parallel mode regime.

6. The method of claim 1 wherein said composite mode regime is a mixed-rate short serial mode regime.

7. The method of claim 1 wherein the analyzing of said multiple channel signal includes digitizing thereof.

8. The method of claim 1 wherein the analyzing of said multiple channel signal includes sampling thereof.

9. The method of claim 1 wherein the analyzing of said multiple channel signal includes decimating thereof.

10. The method of claim 1 wherein the providing of said time evolutions of the light responses includes filtering sinusoid signals corresponding to the optic channels, thereby obtaining light intensity signals therefor.

11. The method of claim 1 wherein said adaptive resonator bank is a closed-loop resonator bank with frequency adjustment.

12. The method of claim 11 wherein said closed-loop resonator bank is realized as a spectral observer configured for separation optic channels from each other.

13. The method of claim 11 wherein said closed-loop resonator bank includes spectral observer states configured for filtering out signal trends.

14. The method of claim 11 wherein said closed-loop resonator bank includes spectral observer states configured for filtering out corresponding optical and electromagnetic disturbances of the signal.

15. The method of claim 11 wherein said closed-loop resonator bank is realized as a spectral observer configured for filtering out a noise signal.

16. A system for determination of at-least one blood parameter of a blood perfused fleshy medium, the system comprising:

(i) a generator for providing a train of activating pulses;

(ii) a multiplexer (MUX) coupled to the generator configured for switching the activating pulses between different optic channels, wherein said

switching is carried out in a composite mode regime for said activating pulses;

(iii) a probe including:

(a) an illumination assembly having a plurality of light sources coupled to the MUX and activated by said activating pulses for generating amplitude-modulated light of more than two different optic channels having wavelength in a range where the scattering properties of blood are sensitive to light radiation, and

(b) a photodetector adapted for sensing a light response of the medium and generating a multiple channel signal reflecting blood characteristics;

(iv) an analyzer configured for analyzing said multiple channel signal, wherein the analyzer includes a digital signal processor having:

(a) an adaptive resonator bank unit configured for filtering said multiple channel signal and separating at least a part of multiple channels from each other; and

(b) an output filtering unit configured for obtaining time evolutions of the light responses of the medium for the part of said multiple channels,

17. The system of claim 16 wherein said composite mode regime is a short serial mode regime.

18. The system of claim 17 wherein said short serial mode regime represents at least one on-off ignition cycle.

19. The system of claim 16 wherein said composite mode regime is a short serial-parallel mode regime.

20. The system of claim 16 wherein said composite mode regime is a mixed-rate short-serial mode regime.

21. The system of claim 16 wherein said analyzer includes an analog-to-digital converter for digitizing and high-rate sampling said multiple channel signal,

22. The system of claim 16 wherein said analyzer includes a first decimator for decimating the signal after the initial high-rate sampling.

23. The system of claim 16 wherein said analyzer includes a second decimator configured for outputting said time evolutions of the light responses at a lower sampling rate.

24. The system of claim 16 wherein a synchronization is provided between the illumination assembly and the adaptive resonator bank.

25. The system of claim 16 wherein said adaptive resonator bank is a closed-loop resonator bank with frequency adjustment.

26. The system of claim 25 wherein said closed-loop resonator bank is realized as a spectral observer configured for separation optic channel from each other.

27. The system of claim 25 wherein said closed-loop resonator bank is realized as a spectral observer configured for filtering out signal trends.

28. The system of claim 25 wherein said closed-loop resonator bank is realized as a spectral observer configured for filtering out corresponding optical and electromagnetic disturbances of the signal.

29. The system of claim 25 wherein said closed-loop resonator bank is realized as a spectral observer configured for filtering out a noise signal.

30. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for decomposition of a multiple channel signal reflecting characteristics of a blood perfused fleshy medium for use in determination of at least one desired blood parameter, where said multiple channel signal being generated in response to illuminating a portion of the medium by amplitude-modulated light of more than two different optic channels having wavelength in a range where the scattering properties of blood are sensitive to light radiation, the method steps comprising:

analyzing said multiple channel signal, where the analyzing includes:

(i) filtering said multiple channel signal and separating at least a part of multiple channels from each other; and

(ii) providing time evolutions of the light responses of the medium for the part of said multiple channels,

the method steps, wherein

said amplitude-modulated light is activated in a composite mode regime representing a combination of parallel and serial modes; and

the filtering of said multiple channel signal and the separating of said multiple channels from each other both includes applying an adaptive resonator bank to said multiple channel signal.

31. A computer program product comprising a computer useable medium having computer readable program code embodied therein for decomposition of a multiple channel signal reflecting characteristics of a blood perfused fleshy medium for use in determination of at least one desired blood parameter, where said multiple channel signal being generated in response to illuminating a portion of the medium by amplitude-modulated light of more than two different optic channels having wavelength in a range where the scattering properties of blood are sensitive to light radiation, the computer program product comprising:

computer readable program code for causing the computer to analyzing said multiple channel signal, where the analyzing includes:

filtering said multiple channel signal and separating at least a part of multiple channels from each other; and

providing time evolutions of the light responses of the medium for the part of said multiple channels,

wherein

said amplitude-modulated light is activated in a composite mode regime representing a combination of parallel and serial modes; and

the filtering of said multiple channel signal and the separating of said multiple channels from each other both includes applying an adaptive resonator bank to said multiple channel signal.